

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to Fig. 25.

Attachment: Replacement sheet
 Annotated sheet showing changes

REMARKS

Applicant amends claim 13, 15, 16, cancels claim 14, and add new claims 21-25. No new matter is added. Support for the claim amendments may be found from the claims as originally filed. Claims 1-12 and 18-20 are withdrawn from consideration. Hence, claims 13, 15-17, and 21-25 are presented for examination, of which claim 13 is independent. Applicant respectfully submits that the pending claims define over the art of record.

Objection to the Specification

The Examiner objects to the specification due to minor informalities. Applicant amends the specification to address the Examiner's concerns. Applicant respectfully requests that the Examiner reconsider and withdraw the objection to the specification.

Objection to the Drawings

The Examiner objects to the drawings due to minor informalities. Applicant amends the specification and the drawings to address the Examiner's concerns. Applicant respectfully requests that the Examiner reconsider and withdraw the objection to the drawings.

Claim Rejection under 35 U.S.C. §102

Claims 13, 16, and 17 are rejected under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,049,458 to Sato et al. (hereafter "Sato"). Applicant respectfully submits that the Sato reference does not disclose the limitation that the electrolyte electrode assemblies are arranged along at least one virtual circle concentric with a central axis of the separators, as required by amended claim 13.

The Sato reference only discloses fuel cells with a rectangular arrangement of cell members. Hence the Sato reference does not disclose the limitation that the electrolyte electrode assemblies are arranged along at least one virtual circle concentric with a central axis of the separators, as required by amended claim 13.

Applicant respectfully requests that the Examiner reconsider and withdraw the rejections of claim 13 and its dependent claims 16-17.

Claim Rejection under 35 U.S.C. §103(a)

Claims 14 and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over the Sato reference further in view of United States Patent No. 3,492,165 to Guillot et al. (hereafter “Guillot”). Claim 14 is canceled, hence the rejection is moot. Applicant respectfully submits that the combination of the Sato reference and the Guillot reference do not teach or suggest the limitation that at least three of the protrusions are provided around each of the electrolyte electrode assemblies so that the electrolyte electrode assemblies are arranged along at least one virtual circle concentric with a central axis of the separators, as required by claim 13.

The Guillot Reference

The Guillot reference teaches a fuel cell battery that improves output capacity and fluid tightness. The Guillot teaches a plate 3 with multiple cavities/holes 2 that can be used to hold elementary cells 1 in the cavities. Crowns 11 are provided between two adjacent plates 3 to provide fluid tight compartments. See Col 3, lines 59-70 and Col. 4, lines 31-42. The Guillot reference uses a honeycomb-like structure to densely pack the elementary cells, independent of the actual shape or arrangement of the cells. See Col. 5, lines 11-26. In contrast, amended claim 14 recites that at least three protrusions are provided around the electrolyte electrode assemblies to position the electrolyte electrode assemblies between the separators so that the electrolyte electrode assemblies are arranged in a virtual circle concentric with a central axis of the separators.

The Sato Reference

The Sato reference teaches a flat-plate type solid electrolyte fuel cell with allegedly sufficient cushioning property and gas sealing properties, and the size of the fuel cell can be expanded as needed. In a first embodiment, the Sato reference teaches a fuel cell with only one separator plate in between two adjacent cell members. In this first embodiment, the cell members have a flat rectangular shape and the separator has concave and convex portions. The concave portions are aligned as well as the convex portions. Rows of convex portions are staggered relative to rows of concave portions. There is no disclosure regarding the relative

positioning of the concave and convex portions with respect to the cell members. See Figs. 1, 4, 5 and Col 4. line 16 to Col 5. line 22.

Additionally, all the fuel cells taught by the Sato reference have a rectangular shape with rectangular cell members. The cell members are aligned with one another. There is no teaching or suggestion in the Sato reference that cell members are arranged along a virtual circle.

The Claimed Invention

The claimed invention provides a fuel cell that has a compact and simple structure that also makes positioning of the electrolyte electrode assembly easy to carry out, while still maintaining the desired power generation performance. A fuel cell is provided with separators, where each of the separators has multiple plates and at least one of the plates has multiple protrusions. The claimed invention provides that at least three of the protrusions are provided around each of the electrolyte electrode assemblies to position the electrolyte electrode assemblies between the separators. The positioning of the electrolyte electrode assemblies are such that they are arranged along at least one virtual circle concentric with a central axis of the separators. Hence, the claimed invention solves the problems in the prior art that has difficulty in positioning the assemblies. The claimed invention also avoids the problems in the prior art that uses additional sealing structure for preventing leakage of reactant gases and hence making the fuel cell complicated and large.

Applicant respectfully submits that the combination of the Sato reference and the Guillot reference do not teach or suggest the limitation that at least three of the protrusions are provided around each of the electrolyte electrode assemblies so that the electrolyte electrode assemblies are arranged along at least one virtual circle as required by amended claim 13. Although the Sato reference teaches a separator with concave and convex portions, the Sato reference does not teach or suggest how these concave and convex portions need to be positioned with respect to each cell member so that the electrolyte electrode assemblies are arranged along at least one virtual circle. The Sato reference merely teaches that concave and convex portions are used in a separator to provide good cushioning property.

The Examiner alleges on Page 5 of the Office Action that it would have been obvious to one of ordinary skill in the art to modify the fuel cell of the Sato reference to incorporate the electrolyte electrode assemblies of the Guillot reference because the Guillot reference teaches an electrolyte electrode assembly arrangement that would have improved output capacity and fluid tightness thereby improving overall operating efficiency and capacity. However, the Guillot reference does not teach that circular cell members arranged in a circle can be used in order to achieve the results of improved output capacity and fluid tightness. The combination of the Guillot reference and the Sato reference would merely teach or suggest that the cells need to be densely packed and crowns are used to improve fluid tightness. Applicant respectfully submits that the combination of the Guillot reference and the Sato reference do not teach or suggest the limitation that the electrolyte electrode assemblies are arranged along at least one virtual circle concentric with a central axis of the separators, as required by amended claim 13. Additionally, the use of crowns to improve fluid tightness will inevitably make the fuel cell structure to be complicated and large, which is a problem in the prior art that the claimed invention overcomes.

Accordingly, Applicant respectfully submits that the combination of the Guillot reference and the Sato reference do not teach or suggest the limitation that at least three of the protrusions are provided around each of the electrolyte electrode assemblies so that the electrolyte electrode assemblies are arranged along at least one virtual circle concentric with a central axis of the separators, as required by claim 13. Applicant respectfully submit that claim 15 recites separate patentable subject matter: the virtual circles include an inner circle and an outer circle, and electrolyte electrode assemblies arranged on the inner circle are out of radial alignment with electrolyte electrode assemblies arranged on the outer circle. As such, for this, and the reasons set forth above, Applicant respectfully submits that dependent claim 15 also defines over the art of record.

New Claims

New dependent claims 21-25 are added. Applicant respectfully submits that the new dependent claims also recite separate patentable subject matter. As such, for this and the reasons set forth above, Applicant respectfully submits that the new dependent claims also define over the art of record.

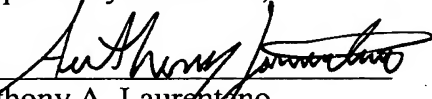
CONCLUSION

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this statement. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. TOW-027 from which the undersigned is authorized to draw.

Dated: April 24, 2006

Respectfully submitted,

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Attachments



25/25

FIG. 25

PRIOR ART

